



Changing climate and changing vector-borne disease distribution: The example of *Dirofilaria* in Europe

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Abstract:

Climatic changes, together with an increase in the movement of dogs across Europe, have caused an increase in the geographical range of *Dirofilaria* infections. The present paper focuses on northeastern European countries, where survey data have shown an increase of *Dirofilaria repens* infections both in animals and humans. A growing degree day-based forecast model has been developed to predict the occurrence. The model is based on evidence that there is a threshold of 14 degrees C below which *Dirofilaria* development will not proceed in mosquitoes, there is a requirement of 130 growing degree-days (GDDs) for larvae to reach infectivity, and there is a maximum life expectancy of 30 days for a mosquito vector. The output of this model predicted that the summer temperatures (with peaks in August) are sufficient to facilitate extrinsic incubation of *Dirofilaria* even at latitudes of 56 degrees N and longitudes of 39 degrees E. Despite the fact that both *Dirofilaria immitis* and *D. repens* have the same temperature requirement for extrinsic incubation in mosquitoes, empirical data has shown that *D. repens* is the main cause of dirofilarial infections in both humans and animals. Clinical signs are absent in most canine infections with *D. repens*. Furthermore, diagnosis is problematic and in-clinic serological tests, such as those for *D. immitis*, do not exist. Therefore, most infections go undiagnosed, allowing the infection to spread undetected.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Temperature

Temperature: Fluctuations

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

Climate Change and Human Health Literature Portal

Non-United States

Non-United States: Europe

European Region/Country: European Region

Other European Region: northeast Europe

Health Impact: 

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: Dengue

Mitigation/Adaptation: 

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology: 

type of model used or methodology development is a focus of resource

Exposure Change Prediction

Resource Type: 

format or standard characteristic of resource

Research Article

Timescale: 

time period studied

Short-Term (

Vulnerability/Impact Assessment: 

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content